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Amendments to the Claims:

This listing of claims replaces all prior listings, and versions, of claims in the present application.

Listing of Claims:

1. (Previously Presented) A transmitter for a portable radio communication apparatus comprising:

a modulator including a first port for inputting a baseband signal, a second port for inputting a local oscillator signal, means for rectifying the input local oscillator signal to provide a conductance waveform at a multiple of the local oscillator and means for mixing the baseband signal with the conductance waveform at said multiple of the local oscillator signal frequency for up-converting the baseband signal to a radio frequency modulated carrier; and

means for controlling the gain of the modulator thereby to control the output level of the modulator.

2. (Previously Presented) A transmitter according to claim 1, wherein:

a local oscillator signal drives the modulator at a multiple of its frequency.

3. (Previously Presented) A transmitter according to claim 1, wherein:

the means for controlling the gain of the modulator comprises current control means.

4. (Previously Presented) A transmitter according to claim 1, wherein:

the modulator comprises two cross-coupled pairs of switching elements, wherein a signal input modulates the switching elements at a multiple of the local oscillator frequency.

5. (Previously Presented) A transmitter according to claim 4, wherein:

said two cross-coupled pairs of switching elements comprise two cross connected long tail pairs of bipolar transistors.

6. (Previously Presented) A sub-harmonic mixer, comprising:

switching means;

a first port for input of a baseband signal to the switching means to be up-converted; and

a second port for inputting a local oscillator signal to drive the switching means at an even multiple of the local oscillator frequency for upconverting the baseband signal to transmission frequency.

7. (Previously Presented) A transmitter of a portable radio communication apparatus comprising:

a modulator including a switching circuit, a first port for input of a baseband signal and a second port for input of a local oscillator signal to the switching circuit which provides a conductance waveform at a frequency multiple of an oscillation frequency of the local oscillator signal, and a mixer which mixes the baseband signal with the conductance waveform at the frequency multiple of the local oscillator signal frequency for up-converting the baseband signal to a radio frequency modulated carrier; and

a gain control, coupled to the modulator, which controls the gain of the modulator to control the output level of the modulator.

8. (Previously Presented) A transmitter according to claim 7, wherein:

the local oscillator signal drives the switching circuit at a multiple of a frequency of the local oscillator.

9. (Previously Presented) A transmitter according to claim 7, wherein:

the gain control comprises a current control.

10. (Previously Presented) A transmitter according to claim 7, wherein the switching circuit of the modulator comprises:

two cross-coupled pairs of switching elements, wherein the local oscillator signal modulates the switching elements at the frequency multiple of the local oscillator frequency.

11. (Previously Presented) A transmitter according to claim 10, wherein: the two cross-coupled pairs of switching elements comprise two cross connected long tail pairs of bipolar transistors.

12. (Previously Presented) A sub-harmonic mixer, comprising:

a switching circuit; and

a first port for input of a baseband signal to the switching circuit to be up-converted; and

a second port for input of a local oscillator signal which drives the switching circuit at an even multiple of the local oscillator frequency for up-converting the baseband signal to a transmission frequency.

13. (New) A transmitter according to claim 1, wherein the means for controlling the gain of the modulator comprises controlling current through the modulator.

14. (New) A transmitter according to claim 7, wherein the gain control comprises controlling current through the modulator.